

smartbox™

USER MANUAL




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IMPORTANT SAFETY INFORMATION

To ensure proper installation and operation, take a moment to read this guide before proceeding with the installation. If you have any questions or comments, please contact your dealer.

	The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
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	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating instructions accompanying the appliance.
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WARNING:	<ul style="list-style-type: none">▪ TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.▪ DO NOT OPEN THE CABINET.▪ REFER SERVICING TO QUALIFIED PERSONNEL ONLY.
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CAUTION:	TO PREVENT ELECTRIC SHOCK, DO NOT USE THE POLARIZED PLUG WITH AN EXTENSION CORD RECEPTACLE OR OTHER OUTLET UNLESS ALL THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.
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Read Instructions: All safety and operating instructions should be read before the appliance is operated.	Reliable Earthing: Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).
Retain Instructions: The safety and operating instructions should be retained for future reference.	Power Sources: This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supplied to your home, consult your appliance dealer or local power company.
Heed Warnings: All warnings on the appliance should be adhered to.	Power Cord Protection: Power supply cords should be routed so they are not likely to be walked on or pinched by items placed on or against them. Pay particular attention to cords and plugs, convenience receptacles, and the point where they exit from the appliance.

<p>Follow Instructions: All operating and user instructions should be followed.</p>	<p>Lightning: For added protection during a lightning storm or when it is left unattended or unused for long periods of time, the unit should be disconnected from the power source.</p>
<p>Cleaning: Unplug this appliance from the wall outlet before cleaning. Use a damp cloth for cleaning. Do not use liquid cleaners or aerosol cleansers.</p>	<p>Power Lines: An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching power lines or circuits—contact with them may be fatal.</p>
<p>Do Not Use Attachments: Use of attachments not recommended by the manufacturer may cause hazards.</p>	<p>Object and Liquid Entry: Never push objects of any kind through openings into this product as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.</p>
<p>Water and Moisture: Do not use this product near water, for example: near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool.</p>	<p>Servicing: Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.</p>
<p>Accessories: Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult and serious damage to the appliance.</p>	<p>Damage Requiring Service: Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:</p> <ul style="list-style-type: none"> a) When the power supply cord or plug is damaged. b) If liquid has been spilled or objects have fallen into the product. c) If the product has been exposed to rain or water. d) If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions. An improper adjustment may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation. e) If the product has been dropped or the cabinet has been damaged. f) When the product exhibits a distinct change in performance—this indicates a need for service.
<p>Elevated Operating Ambient: If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature 50°C.</p>	<p>Replacement Parts: When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original parts. Unauthorized substitutes may result in fire, electric shock, or other hazards.</p>
<p>Reduced Air Flow: Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.</p>	<p>Safety Check: Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating conditions.</p>

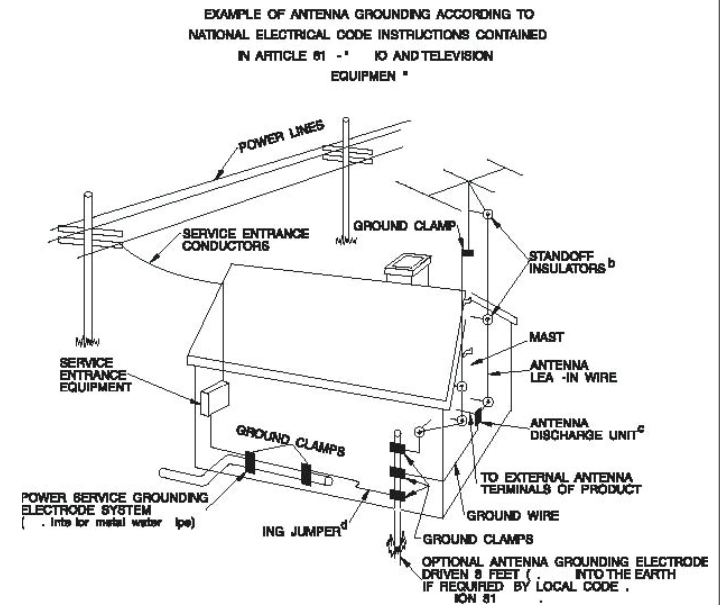
Mechanical Loading: The IPQ-PRO-12 is designed to be rack mounted in a standard EIA 19 inch width telecommunications rack. Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

Outdoor Antenna Grounding: Before attempting to install this product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges.

- a) Use No.10 AWG (5.3mm) copper, No.8 AWG (8.4mm) aluminum, No.7 AWG (10mm) copper-clad steel or bronze wire or larger, as ground wire.
- b) Secure antenna lead-in and ground wires to house with stand-off insulators spaced from 4 feet (1.22m) to 6 feet (1.83m) apart.
- c) Mount antenna discharge unit as close as possible to where lead-in enters house.
- d) A driven rod may be used as the grounding electrode where other types of electrode systems do not exist. Refer to the National Electrical Code, ANSI/NFPA 70-1984 for information.
- e) Use jumper wire not smaller than No.6 AWG (13.3mm) copper or equivalent, when a separate antenna grounding electrode is used.

Circuit Overloading: Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Grounding Example from National Electrical Code



CHAPTER 1 INTRODUCTION TO smartbox™

Thank you for purchasing a DISH **smartbox**. **smartbox** is designed to be a revolutionary product for use in bulk video distribution applications. **smartbox** is much more than a commercial satellite receiver; it is a highly integrated video distribution platform. **smartbox** is designed from the ground up to operate in a 24/7/365 environment. Furthermore, **smartbox** is designed to be highly flexible by providing multiple operating modes that can be enabled simultaneously.

There are three functional concepts that are important to understand about **smartbox**:

1. Signal Reception—**smartbox** uses a single common set of assets to receive DISH satellite signals. The satellite receiver blades then output TV channels or transponders to the backplane in the chassis for distribution by one or more signal output blades.
2. Signal Output—Multiple options for video output are available. These various output blades can be configured in any combination considering there are no inherent capacity limitations in the **smartbox** architecture.
3. Operational Modes—All modes of operation in **smartbox** are enabled via DISH feature enabling codes. Unlike other third party devices, which have been historically used with DISH receivers, the outputs for **smartbox** must be authorized or they will not function.

Site Requirements

All sites must provide the following:

1. Satellite dish(es) and LNB(s) installed with power inserters*, cables, and peaked. Typical satellite orbitals: 61.5, 72.7, and 77 degrees on East Coast, 110, 119 and 129 degrees on West Coast, 118.7 degrees for International. Mixing and matching is not allowed.
* DISH 4-port high-capacity power inserter/surge protector (DN005050). An alternative is a DPP 44 multi-dish switch with a DPP 44 power inserter and TSS-2400 coaxial surge protectors.
2. Nine inches of clearance above the **smartbox** chassis for cooling airflow exhaust.
3. External terrestrial antennas installed and cabled to receive local channels for installations needing off-air (ATSC) sources.
4. Internet connectivity via Ethernet cable and/or cellular modem connectivity via antenna mounted on the **smartbox**.
5. 120 V AC power for **smartbox** power supplies and power inserters.
6. Ability to maintain ambient air temperature around **smartbox** between 0 and 50°C (32–122°F) for system cooling.
7. Ability to maintain non-condensing relative humidity around the **smartbox** between 5 to 95%.
8. Site plan/schema for mapping services to plant carrier frequencies.

Installation Overview

The following is an overview of the process of assembling, testing, and delivering the **smartbox** to a customer site. Subsequent chapters contain detailed step-by-step instructions. Follow the information flow of the chapters to ensure a successful setup of the **smartbox** hardware and software.

- **Assemble Hardware** — Install blades, connect cables, connect power supplies and power.
- **Establish Communication with **smartbox**** — Connect to network and login.
- **Enable Satellites and Verify Tuners Lock** — Discover satellites and check that the tuners have locked properly.
- **Scan for Spot Beams** — Use the Start Spot Beam Scan feature to locate local channels.
- **Update Software and Reboot System** — Download the latest version of software from the satellite.
- **Verify Software Version** — Check that the download completed successfully.
- **Authorize** — Authorize your **smartbox** with DISH so that you are able to receive programming.
- **Scan for Services** — Use the features Scan for Satellite Services and Scan for ATSC Services to identify services authorized for the **smartbox**.
- **Configure** — Configure the services for output.
- **Perform Soak Test** — Allow the **smartbox** to run for between 24 and 48 hours. Perform a functional test at the end of the soak to ensure all components are functioning as they should be.
- **Prepare to Ship** — Once the **smartbox** is fully configured and is operating as expected, remove the power supplies and use the chassis box to ship the unit.
- **Install on Customer Site** — At the customer site, connect the **smartbox** to satellite feeds, power sources, Internet connection. Then scan for local channels, and set up Welcome Channel, Program Guide, and other channels.

NOTE: To ensure the most current software download, including the latest features and functionality, set up and test the **smartbox** just before it is due to be set up on the customer site.

CHAPTER 2 ASSEMBLE HARDWARE

smartboxes use semiconductors that can be damaged by electrostatic discharge (ESD). When handling **smartbox** components, care must be taken to prevent damage. Damage due to improper handling is not covered by warranty.

WARNING: The following precautions must be taken whenever handling bare circuitry—this includes removing and/or inserting blades into the chassis. Do not open the protective conductive packaging until you read the following instructions and are at an anti-static work station.

- Use a conductive wrist strap attached to a stable earth ground.
- Use an antistatic mat to cover your work surface.
- Always discharge yourself by touching a grounded bare metal surface or antistatic mat before picking up an ESD-sensitive electronic component.

Install Chassis and Power Supplies

1. Remove the chassis, power supplies, blades, and filler plates from the shipping boxes. Save the boxes and packing material for future use.

NOTE: Refer to the chapter on reshipping **smartboxes** for details on disassembling and packing a **smartbox** for shipment.

2. Install the chassis in a 19 inch rack or a wall mount, or position it on a desk or table top. All connections are on the front of the **smartbox**. The path of the air flow is through the front of the unit and out the top of the unit.

CAUTION: The chassis requires at least 9 inches of clearance above the chassis fans to ensure adequate airflow. **DO NOT** block the top or front of the chassis.

CAUTION: Ambient air temperature must be kept between 0 and 50°C (32–122°F) to provide adequate cooling for the system.

3. Plug the power supplies into the chassis.



WARNING: Ensure the chassis is connected to an earth ground; use the ground screw next to the ground symbol (⏏) on the chassis. Refer to “Important Safety Instructions” at the beginning of this manual for specific information related to proper grounding.

Inspect, Distribute, and Install Blades

1. Inspect each blade prior to installation:

- a) Verify that each satellite receiver blade has an SMP bullet (connects blade to backplane).
- b) Verify that each satellite receiver blade has one smart card loaded in each of its two ProCams.
- c) Verify that heat sinks are in place on all blades and transcoder modules. The table below identifies the number of heat sinks for each component.

Component	Number of Heat Sinks
Satellite Receiver Blades	1
ATSC Receiver Blades	7
QAM Blades	2
Transcoder Modules	5

If a part is missing, contact DISH for a replacement.

2. Plan the distribution of the blades across the **smartbox** chassis. Arrange them as follows:

- a) Slots 1—12 are allocated for satellite and ATSC receiver blades.

NOTE: Every **smartbox** must have at least one satellite receiver blade to operate.

- b) Slots 13—16 are allocated for output blades (QAM).
- c) Blades should be distributed as evenly as possible across the slots. This ensures optimal airflow through the chassis.
- d) Refer to the next section if transcoder modules need to be mounted on blades. Then return to this section and complete steps 3 and 4.

3. Install the blades according to the distribution plan.

- a) Slide each blade into the appropriate slot rails; ensure the SMP bullet connects with the backplane.
- b) Finger-tighten screws on front of blades to secure in chassis.

4. Install blank filler plates in remaining open slots. Finger-tighten screws to secure to chassis.

Mount Transcoder Modules

1. Place the host blade on a flat, static-free surface with the component side up.
2. Remove the transcoder module from the antistatic bag.

NOTE: The module is shipped with four screws (4-40 X.125, PAN, SS) and four hex standoffs (STDF, F/F, .156 X, .1875 HEX, 4-40) mounted on it. Additional screws for attaching the receiver blade to the module are shipped with the board.

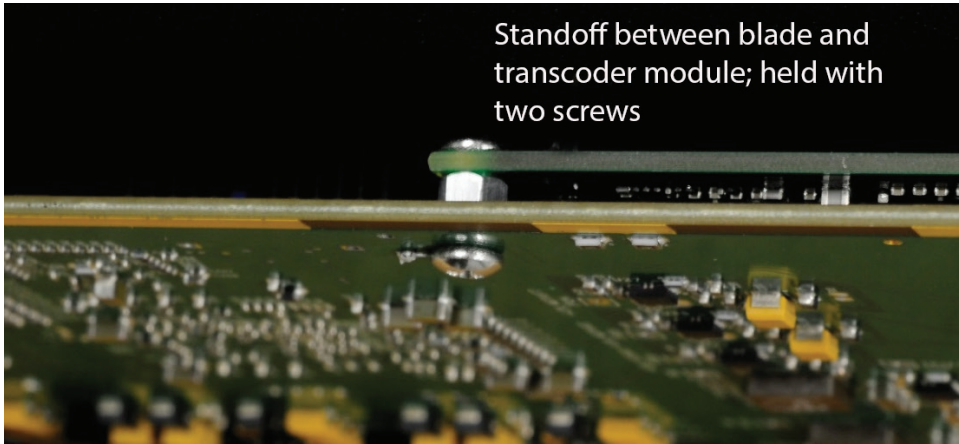


Figure 1. Mounting Hardware – Transcoder Module to Receiver Blade

3. Align the connector on the transcoder module with the connector on the host blade. See Figure 2. Gently press down until the connection is secure.

CAUTION: Do not force the connectors. Forcing the connectors can damage the connector pins.

4. Insert the remaining screws from the back side of receiver blade into the standoffs and gently tighten.
5. Return to step 3 in the previous section to complete the installation of blades.

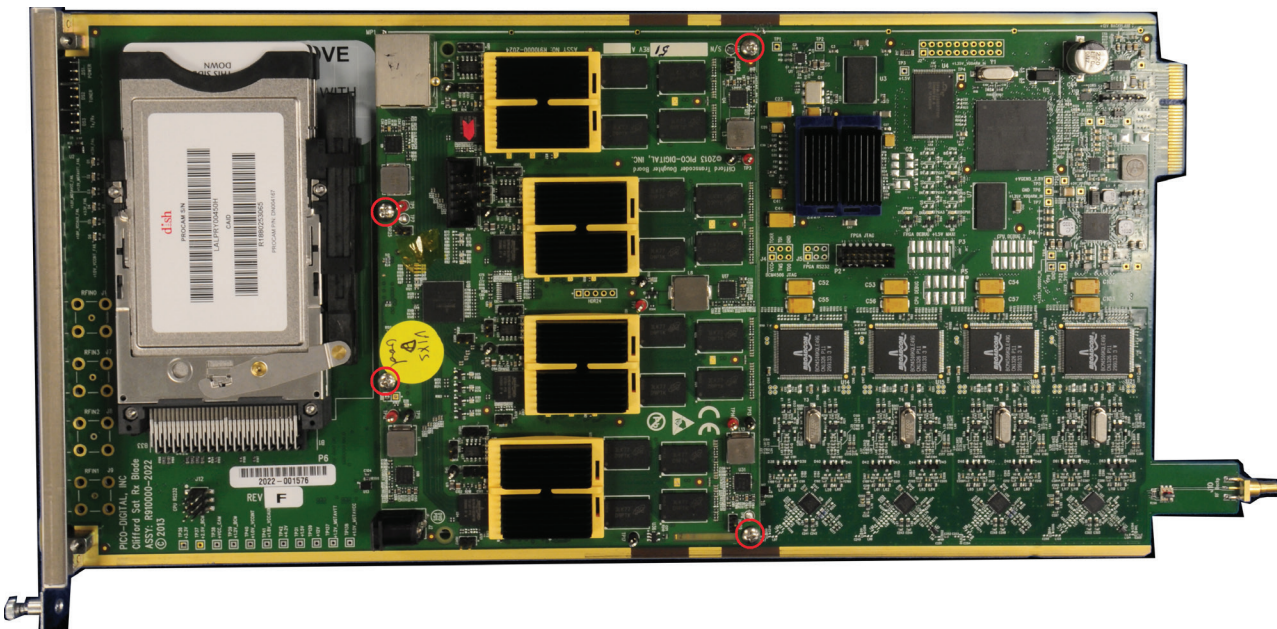


Figure 2. Satellite Receiver Blade with Transcoder Module – Attached With Four Screws

Mount Power Inserter and Connect Input/Output Cables to Power Inserter

An external power source and in-line surge protector(s) must be installed on the coax line(s) between the **smartbox** and the satellite's LNB. The recommended solution is to use a DISH 4-port high capacity power inserter with built-in surge protection (DN005050). This is only for situations where the LNB is within 100 feet of the **smartbox**.

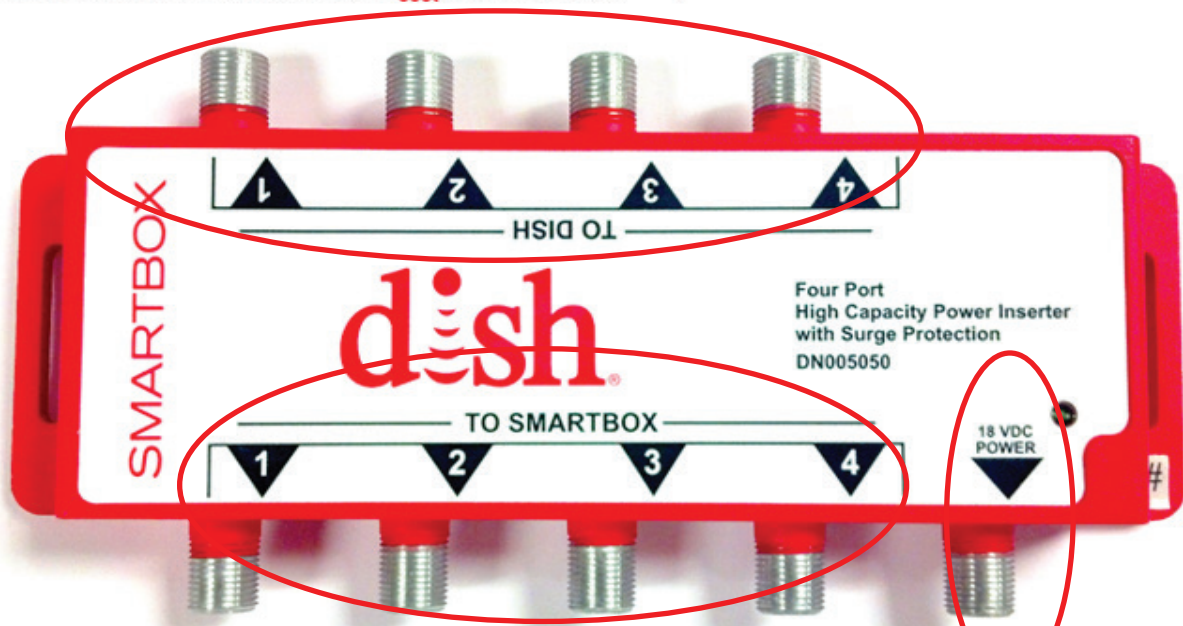
An alternative solution is to use a DISH DPP 44 switch and Tru Spec TSS-2400 coaxial surge protectors. Both options are detailed below.

DISH 4-Port High Capacity Power Inserter (DN005050)

1. Securely mount a DISH 4-port high capacity power inserter/surge protector (DN005050) to an appropriate wall or surface.
2. Connect cables from the LNBs to ports 1, 2, 3, 4 (as needed); these are marked TO DISH on the power inserter.
3. Connect corresponding ports 1, 2, 3, 4 marked TO **smartbox** on the power inserter to the Sat 1, 2, 3, 4 connectors on the front of the **smartbox**.
4. Connect the supplied AC adapter to the 18V DC power port on the power inserter.
5. Plug the AC adapter into a power source.

CAUTION: For cable runs of greater than 100 feet, additional amplification and amperage may be required.

Connect LNBs from satellites to TO DISH Ports 1 — 4



Connect TO SMARTBOX Ports 1 — 4 to Sat 1, Sat 2, Sat 3, and Sat 4 connectors on front of smartbox

Connect power adaptor to 18 VDC connector

Figure 3. DISH 4-Port High Capacity Power Inserter with Surge Protection

DPP 44 Switch

A DISH DPP 44 may also be used to provide power to the LNB. It should be mounted on the coax line between the **smartbox** and the LNB. Additionally, Tru Spec TSS-2400 coaxial in-line surge protectors are recommended. This solution is only for situations where the LNB is within 100 feet of the **smartbox**.

CAUTION: For cable runs of greater than 100 feet, additional amplification and amperage may be required.

1. Securely install the DPP 44 switch.
2. Connect an earth ground wire to the grounding lug.
3. Connect cabling from the LNBs into the “TO DISH” ports of the DPP 44.
4. Connect cabling from the “TO ADDITIONAL SWITCH” ports of the DPP 44 switch to TSS-2400 coaxial surge protectors.
5. Connect the TSS-2400 coaxial surge protectors directly to the satellite connectors (Sat 1, Sat2, etc.) on the front of the **smartbox**.
6. Connect the DPP 44 power inserter into the bottom left F-connector (labeled for power insertion).
7. Connect the DPP 44 power inserter to the power adapter and plug into 120V AC power.

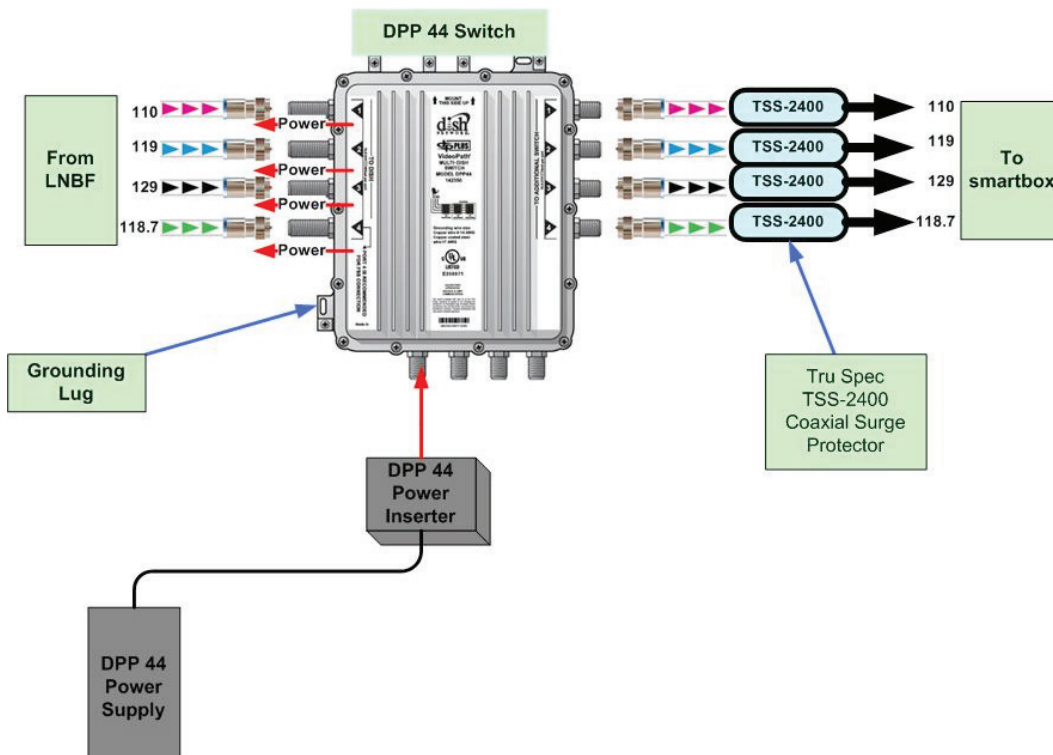


Figure 4. DPP 44 Power Inserter Switch and Coaxial Surge Protectors

Connect Cables to Connectors and Install Cellular Antenna

1. Connect a cable from an external terrestrial antenna to the “Antenna In” connector on the front of the ATSC blade (if installed). If more than one ATSC blade is installed, use a splitter to connect the cards.
2. Connect the QAM blade output port to the cable plant. If the **smartbox** contains multiple output cards (e.g., QAM and NTSC), use an external combiner to combine their signals on a single coax cable.
3. Screw the cellular antenna into the SMA connector on the front right of the **smartbox**.

CHAPTER 3 ESTABLISH COMMUNICATION WITH **smartbox**

Connect **smartbox** to Ethernet

1. Connect an Ethernet cable between the port labeled Data 1 (located to the right of the DISH logo on the front of the **smartbox**) and an Ethernet port on a router or computer.

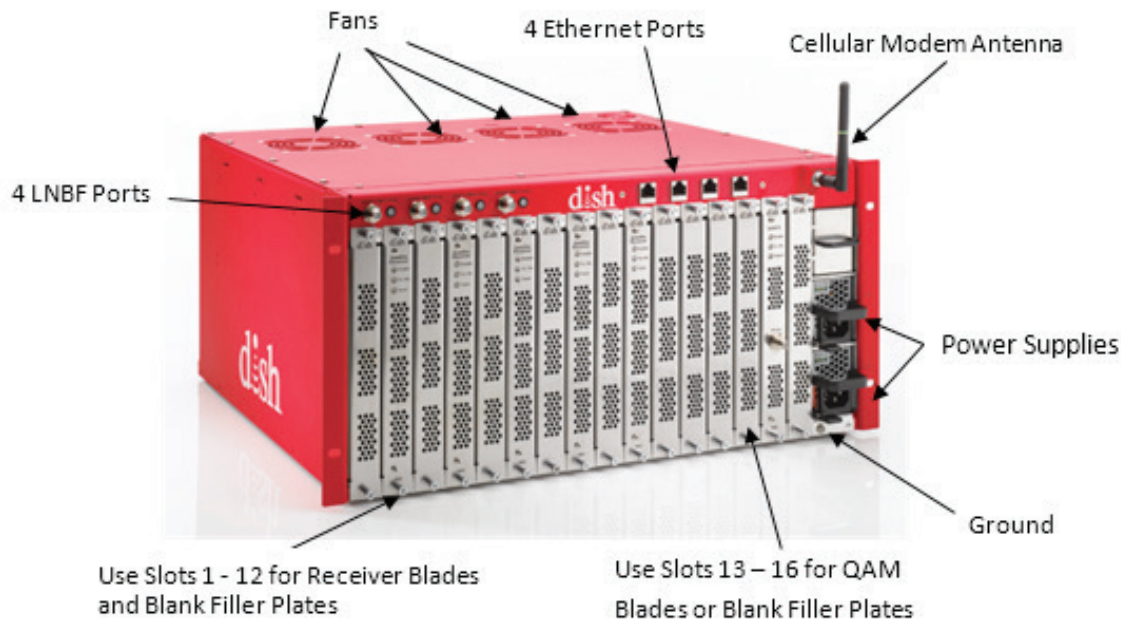


Figure 5. **smartbox** Components

2. Plug the **smartbox** power supply into an uninterruptible power supply (UPS) providing AC power. The system powers on and self-boots.

Four LED indicators located next to the satellite ports on the front of chassis blink during boot. LED's turn solid green when boot-up is complete if adequate satellite power level is detected. (For backplane V.0.0.62 or higher.) System boot may take up to 5 minutes.

Configure Network

Set up network settings to enable communication between the computer and the **smartbox**.

NOTE: Depending on the version of Windows™ on your network, the path to configure the connection may vary slightly. Configuring an IP address is usually initiated through the Windows Control Panel and the Network option.

1. Open the **Control Panel**, then the **Network** option.
2. Double-click **Local Area Connection**. The Local Area Connection Properties window opens.
3. Check **Internet Protocol (TCP/IP)** and click **Properties**. (See figure 6.) The **Internet Protocol (TCP/IP) Properties** window appears.

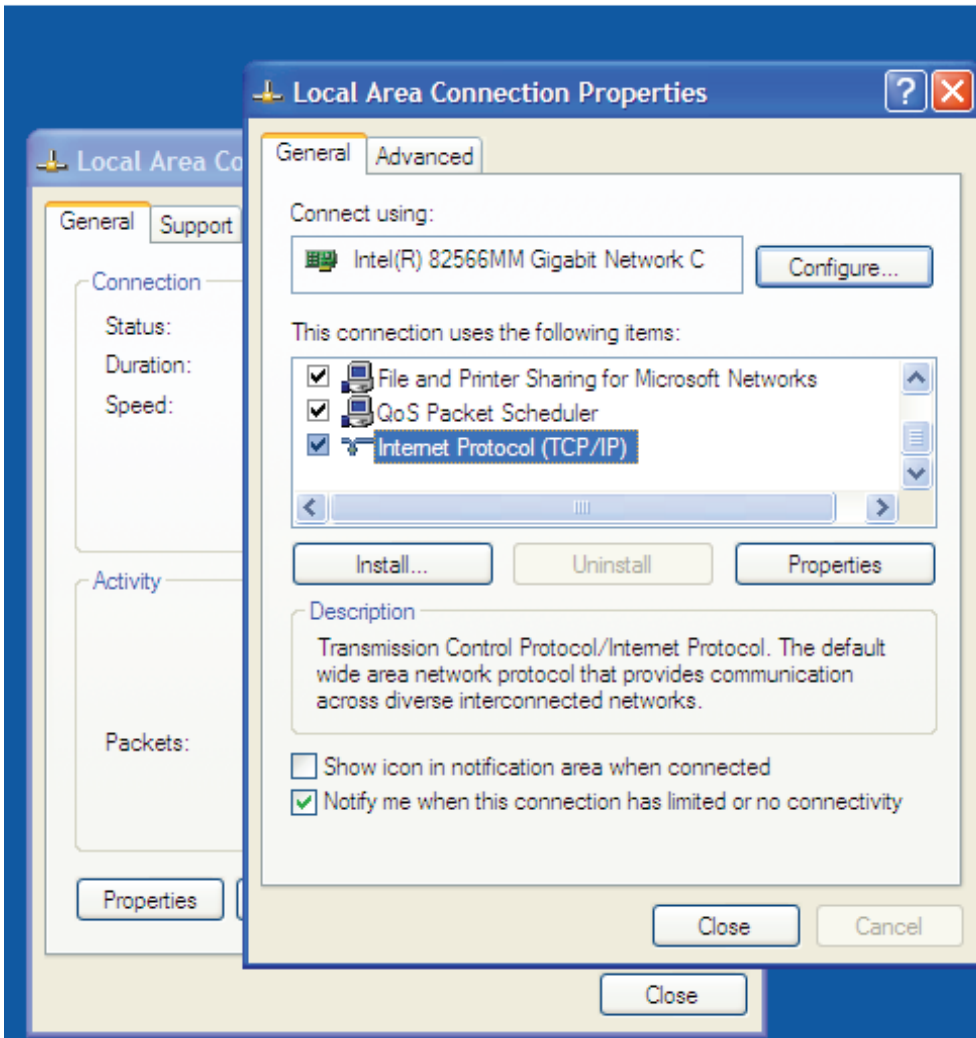


Figure 6. Configure Network - Select Internet Protocol (TCP/IP)

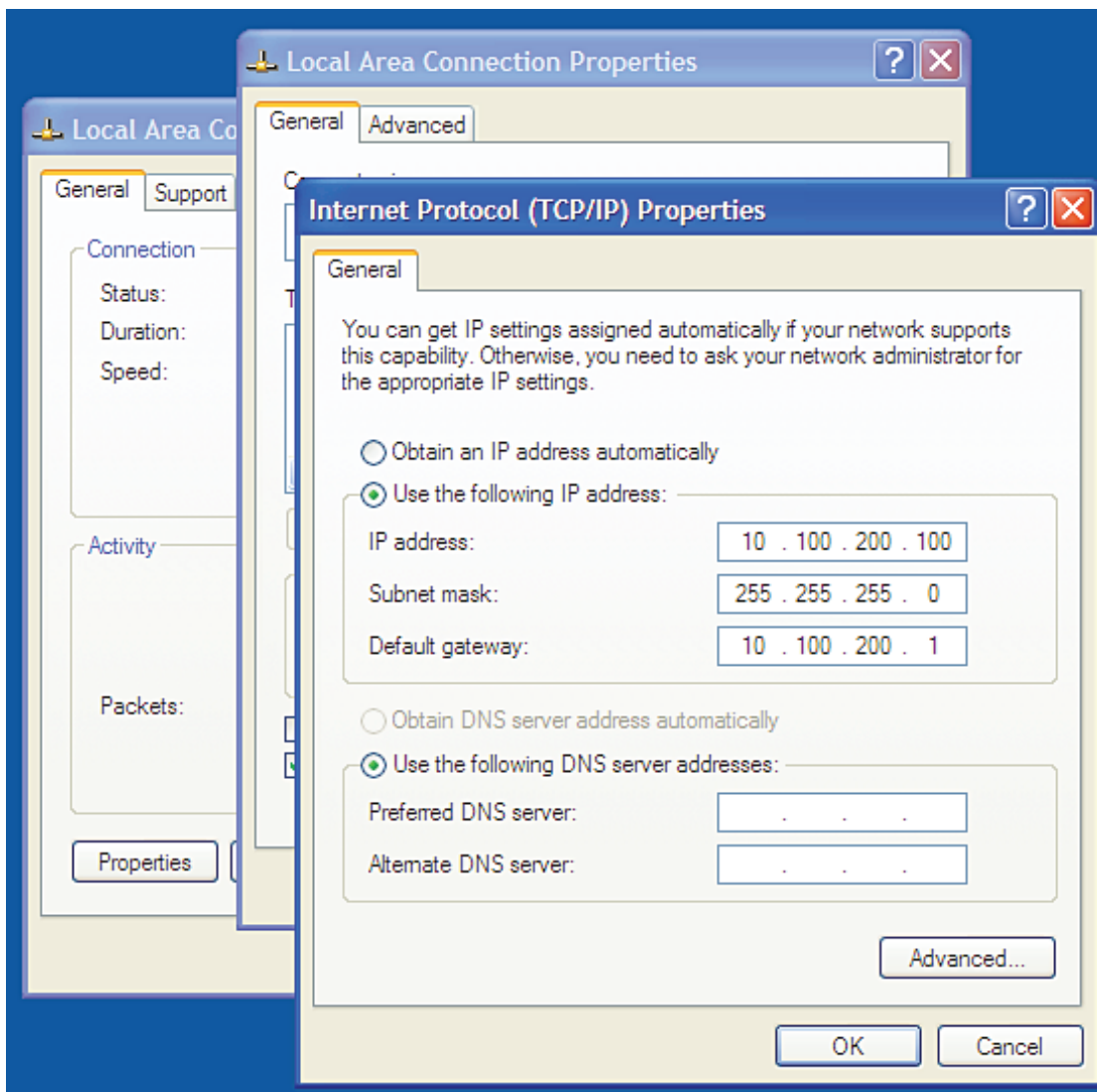


Figure 7. Internet Protocol (TCP/IP) Properties – Enter IP Address

4. Select the option **Use the following IP address** and enter the IP address:

IP Address = **10.100.200.100**

Subnet Mask = **255.255.255.0**

Default Gateway = **10.100.200.1**

5. Click **OK**, then **Close** to complete the setup and exit.

Login to smartbox

1. Open a web browser. Firefox™ and Chrome™ are recommended.
2. Enter **10.100.200.10** in the URL.

The DISH **smartbox** Login page should appear. (See figure 8.) If it does not, verify that the IP address was set up correctly.

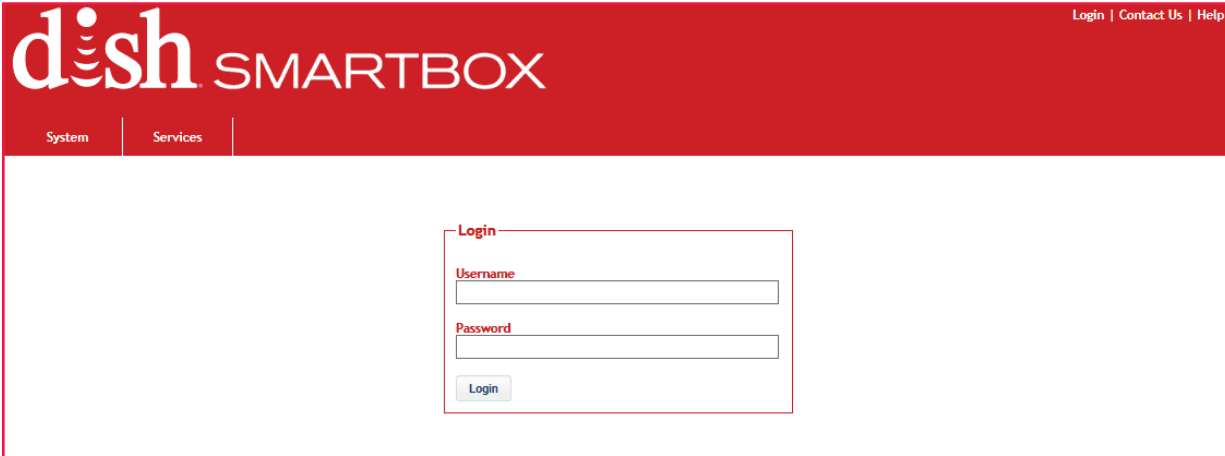


Figure 8. Login Screen

NOTE: By default, each **smartbox** is configured with the IP address:

IP Address = 10.100.200.10

Subnet Mask = 255.255.255.0

Default Gateway = 10.100.200.1

DHCP client = Disabled

If the default address for the **smartbox** is changed, be sure to document the new address for future access.

3. Enter the default username and password:

Username = username

Password = password

4. Click **Login**.

Note: For security purposes, once logged in, click the **Admin** tab, reset the username and password, click **Apply**, and record the new username and password.

CHAPTER 4 AUTHORIZE THE smartbox

Authorization of the **smartbox** is a simple process that entails generating a list of information related to the hardware components and providing this information to DISH. Once received and processed by DISH, the authorization of the **smartbox** occurs automatically and is transparent to the user.

NOTE: Authorization can take up to 24 hours. The **smartbox** needs to remain powered on and locked to satellites.

- 1. Click the **Configurations** tab. For new installations, there will be no information related to Features and Blades. (See figure 9.)

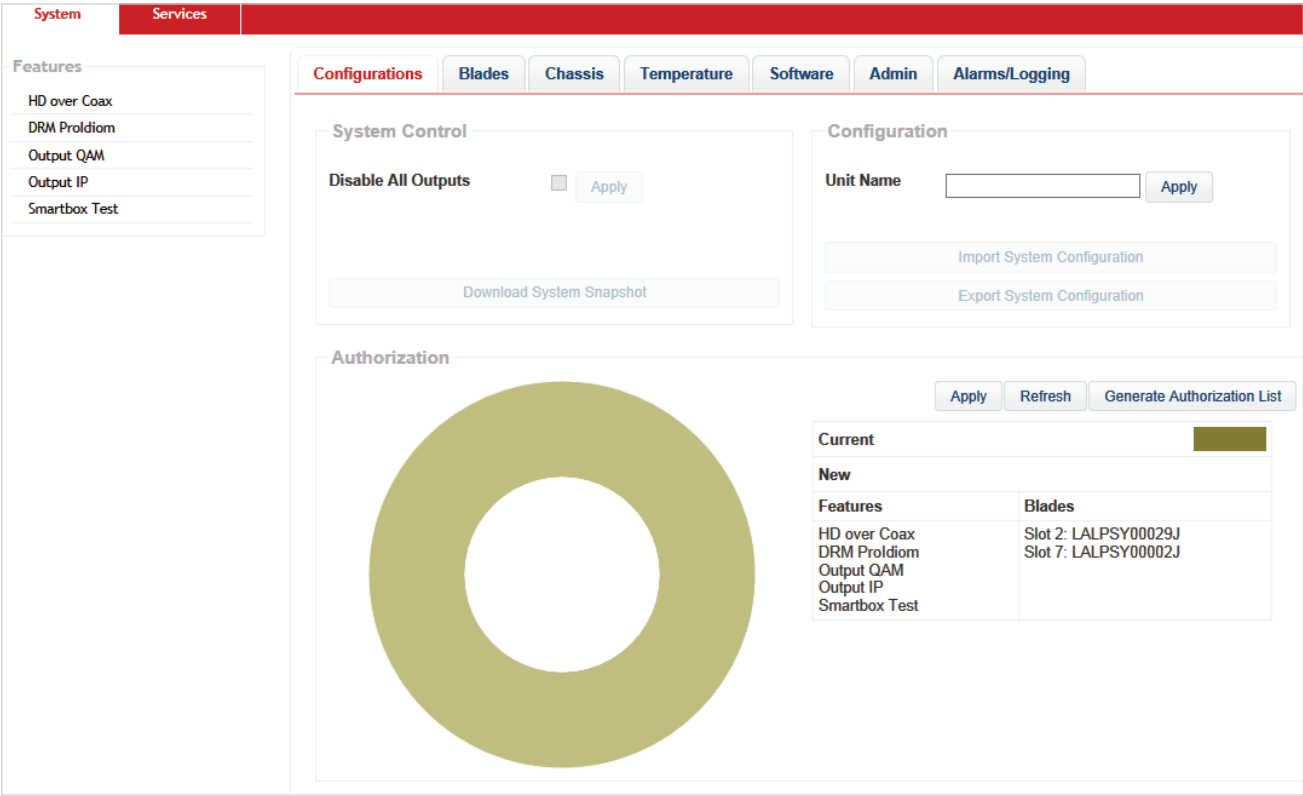


Figure 9. Configurations Tab

2. Click **Generate Authorization List**. A comma-separated values (.csv) file is downloaded to your computer. The file contains a list of the chassis number, the blade serial numbers, the receiver CAIDs, and the smart card numbers. (See figure 10.)

	A	B	C	D	E
1	Chassis Serial	Serial Number	CAID	SmartCard	
2	LALPFY00071K	LALPSY00313L			
3	LALPFY00071K	W--PR-----	R1880252912	S2362977150-58	
4	LALPFY00071K	W--PR-----	R1880253101	S2362977326-36	
5	LALPFY00071K	LALPSY00117K			
6	LALPFY00071K	W--PR-----	R1880253084	S2362977309-19	
7	LALPFY00071K	W--PR-----	R1880251796	S2362966392-07	
8	LALPFY00071K	LALPSY00126K			
9	LALPFY00071K	W--PR-----	R1880252910	S2362977149-57	
10	LALPFY00071K	W--PR-----	R1880253094	S2362977319-29	
11	LALPFY00071K	LALPSY00224L			
12	LALPFY00071K	W--PR-----	R1880251916	S2362966551-68	
13	LALPFY00071K	W--PR-----	R1880251773	S2362966348-63	

Figure 10. Sample .csv File — Authorization List

3. Upload the list to Salesforce and fill out the activation form for processing. For assistance, contact your Area Sales Manager (ASM).

Authorization - 100%

If the system completes the authorization process without error, the donut on the Configurations tab turns a solid color. The color is specific to the particular authorization set.

Once authorization is complete, a list of enabled features, blade slot numbers, and serial numbers appear on the Configurations tab in the Features and Blades columns.

Information regarding Authentication of ProCams, pairing of smart cards, and smart card status can now be viewed on the Blades tab. Click **Details** on the **Blades** tab to review this blade-specific information. Additional details related to blades, ProCams, and smart cards are also found here.

To accept this configuration:

1. Click the **donut**.
2. Click **Apply**. A color bar matching the donut appears in the **New** field and represents the most recent configuration.

Authorization - Less than 100%

If authorization fails for a blade, a second color representing the failed blade(s) displays on the donut. (See figure 11.)

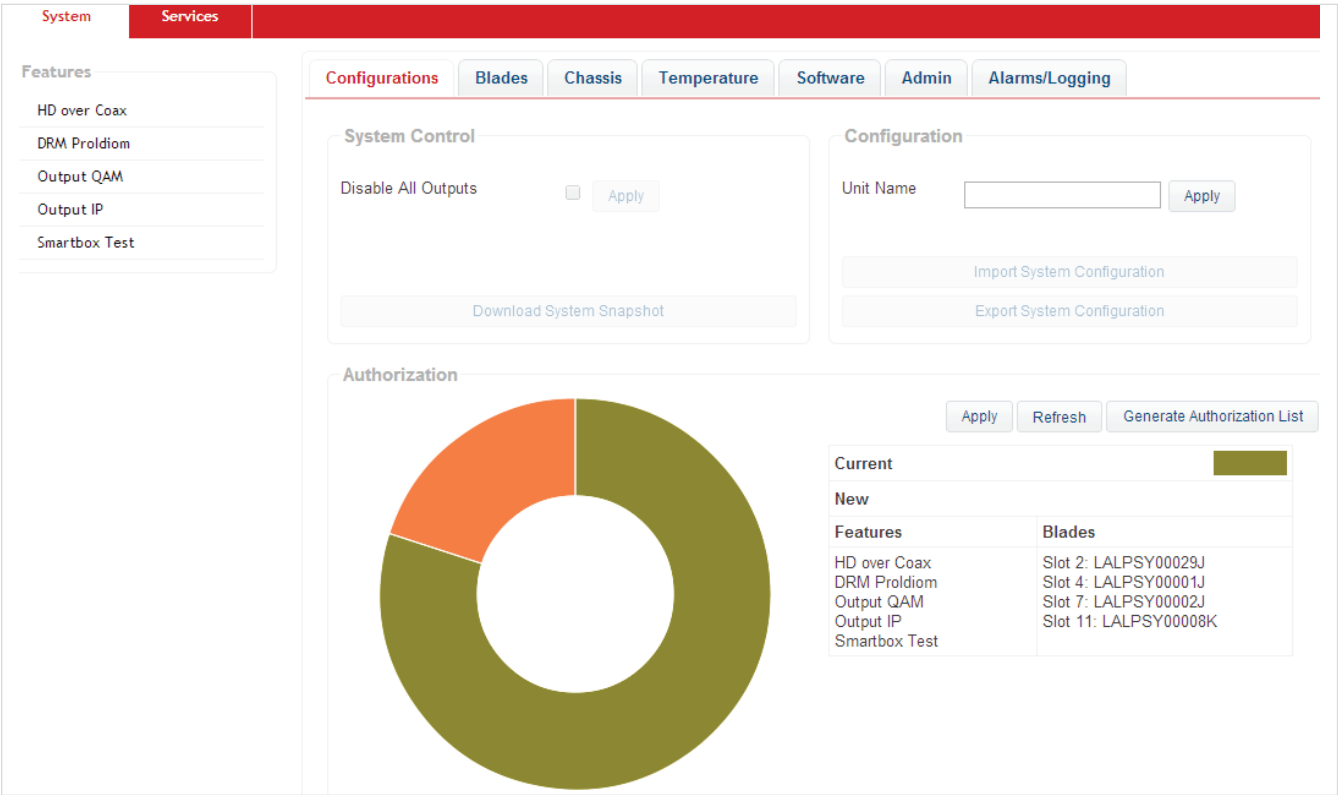


Figure 11. Authorization - Less than 100%

If this happens, check for appropriate signal levels and signal quality at the inputs to **smartbox**. If all specifications for signal level and quality are met, contact DISH Support to assist you. Follow the steps below to confirm the configuration of the authorized components.

1. Click the **part of the donut** representing the authorized components.
2. Click **Apply** to confirm the configuration to be used by your **smartbox**. A color bar matching the authorized part of the donut appears in the **New** field.

CHAPTER 5 ENABLE SATELLITES AND VERIFY LOCKED TUNERS

1. Click the **Chassis** tab. (See figure 12.)

System

Services

Features

HD over Coax

DRM Prodiom

Output QAM

Output IP

Smartbox Test

Configurations

Blades

Chassis

Temperature

Software

Admin

Alarms/Logging

Chassis Info

Serial Number

LALPFY00039J

Part Number

DN004168

Cellular Modem

Model Number

-

Serial Number

-

MEID

-

Received Signal Strength

-

Fan Statuses

Fan #	RPM
1	2548 RPM
2	2497 RPM
3	2506 RPM
4	2625 RPM
5	8544 RPM

L-Band Inputs

	Enable	Satellite	Rx Power
Sat 1	<input type="checkbox"/>		-64 dBm
Sat 2	<input checked="" type="checkbox"/>	119	-31 dBm
Sat 3	<input checked="" type="checkbox"/>	110	-30 dBm
Sat 4	<input checked="" type="checkbox"/>	129	-37 dBm

Apply

Undo

Ready

Start Spot Beam Scan

Ready

Data Port

Data 1	Control Interface
Data 2	Disabled
Data 3	Disabled
Data 4	Disabled

Apply

Undo

Figure 12. Chassis Tab

2. Under **L-Band Inputs**, click the check boxes in the **Enable** column. Check a box for each satellite connected to the **smartbox** satellite inputs (Sat ports 1—4).

NOTE: If your **smartbox** has an earlier version of software, the **Enable** column may display drop-down boxes instead of check boxes.

3. Click **Apply**. A message regarding disruption of satellite services appears. Click **OK**. (**Cancel** allows you to stop the process.) Wait for the system to configure the satellite inputs. The status of the configuration appears to the right of the Apply and Undo buttons; the status changes from *Ready* to *% Complete* to *Ready*.
 4. Check status of tuners.
 - a) Click the **Blades** tab.
 - b) Click the **down-arrow** under **Details** for each satellite blade. Details for the related blade appear.
 - c) Verify that for each satellite receiver blade that one tuner in each set (tuners 1—4 and tuners 5—8) is locked. (See figure 13.) Examples of locked tuner pairs: 1 and 5, 4 and 5, 2 and 7.
- If not locked, return to the **Chassis** tab and verify that the satellites have been enabled and click **Apply** again. Return to the **Blades** tab and verify.

System

Services

Features

HD over Coax

DRM Prodiom

Output QAM

Output IP

Smartbox Test

Configurations

Blades

Chassis

Temperature

Software

Admin

Alarms/Logging

Slot	Status	Blade Type	Enabled	Serial Number	Part Number	Details
2		Satellite Receiver	Yes	LALPSY00029J	DN003389	

Enable

☒

Apply

Undo

Tuner Information

Tuner	Satellite	Transponder	L-Band	Locked	CER	SNR	Enabled	Service #
1	110	-	-	Yes	0	146	Yes	-
2	110	-	-	Yes	0	149	Yes	-
3	110	-	-	Yes	0	148	Yes	-
4	110	-	-	Yes	0	147	Yes	-
5	119	-	-	No	0	0	Yes	-
6	129	-	-	Yes	0	129	Yes	-
7	119	-	-	No	0	0	Yes	-
8	110	-	-	Yes	0	147	Yes	-

Descrambling Status

195 granted

215 granted

Figure 13. Locked Tuners

23

CHAPTER 6 SCAN FOR SPOT BEAMS

Scanning for spot beams allows the **smartbox** to pick up local and regional satellite channels; use when moving from one DMA to another.

1. Click the **Chassis** tab.
2. Click **Start Spot Beam Scan**. The status of the configuration appears to the right of the **Apply** and **Undo** buttons; the status changes from *Ready* to *% Complete* to *Ready*.

The screenshot shows a web interface with a red header bar containing 'System' and 'Services' tabs. Below the header is a navigation bar with tabs: 'Configurations', 'Blades', 'Chassis' (selected), 'Temperature', 'Software', 'Admin', and 'Alarms/Logging'. On the left, there is a 'Features' sidebar with links: 'HD over Coax', 'DRM Prodiom', 'Output QAM', 'Output IP', and 'Smartbox Test'. The main content area is divided into several sections:

- Chassis Info**: A table with 'Serial Number' (LALPFY00039J) and 'Part Number' (DN004168).
- Cellular Modem**: A table with 'Model Number', 'Serial Number', 'MEID', and 'Received Signal Strength', all showing '-'.
- Fan Statuses**: A table with 5 rows showing 'Fan #' and 'RPM' values.
- L-Band Inputs**: A table with 4 rows showing 'Sat', 'Enable' (checkboxes), 'Satellite' (numbers), and 'Rx Power' (dBm). Below this table are 'Apply' and 'Undo' buttons, and a 'Start Spot Beam Scan' button which is circled in red.
- Data Port**: A table with 4 rows showing 'Data' and 'Control Interface' (all set to 'Disabled'). Below this table are 'Apply' and 'Undo' buttons.

Fan #	RPM
1	2548 RPM
2	2498 RPM
3	2506 RPM
4	2623 RPM
5	8544 RPM

Sat	Enable	Satellite	Rx Power
Sat 1	<input type="checkbox"/>		-64 dBm
Sat 2	<input checked="" type="checkbox"/>	119	-31 dBm
Sat 3	<input checked="" type="checkbox"/>	110	-30 dBm
Sat 4	<input checked="" type="checkbox"/>	129	-37 dBm

Data	Control Interface
Data 1	
Data 2	Disabled
Data 3	Disabled
Data 4	Disabled

Figure 14. Start Spot Beam Scan

CHAPTER 7 UPDATE THE smartbox SOFTWARE

Before configuring the **smartbox**, execute the following steps to ensure that the **smartbox** software is up to date.

1. Select **Install update when available** from the **Configuration** drop-down box. (See figure 15.)

The screenshot shows the 'Smartbox' management interface. On the left, there's a 'Features' sidebar with options like 'HD over Coax', 'DRM Prodiom', 'Output QAM', 'Output IP', and 'Smartbox Test'. The main area has tabs for 'Configurations', 'Blades', 'Chassis', 'Temperature', 'Software' (selected), 'Admin', and 'Alarms/Logging'. Under the 'Software' tab, there's a 'Software Version' table and an 'Automatic Update' section.

Blade	Current Version	Downloaded Version	Status
Slot 2	255.1.112	255.1.112	✓ Blade is up to date
Slot 7	255.1.112	255.1.112	✓ Blade is up to date
Slot 9	255.1.112	255.1.112	✓ Blade is up to date
Slot 14	255.1.112	255.1.112	✓ Blade is up to date
Backplane	0.0.62	0.0.62	✓ Backplane is up to date

Automatic Update

Configuration: Install update when available ▼ Check for update now

Time to check update: 5:00 PM ▼

Time to reboot after update: 6:00 PM ▼

Status: ✗ No update available

Apply Undo

Figure 15. Update Software

2. Click **Check for update now**.

- a) No update available — the message *No update available* appears; no reboot is needed. The **smartbox** is ready to be authorized.
- b) Update is available — the system downloads the software and a message appears next to Status: *New software is ready. Please reboot the system*. The software update will take at least 25 minutes.
- c) When complete, click the **Admin** tab and select **Reboot System**. When the reboot is completed, the **smartbox** is ready to be authorized.

NOTES: Use the options **Time to check update** and **Time to reboot after update** to set up automatic updates. Click **Apply** to confirm.

The Configuration drop-down box also contains the **Check for update only** option—select it and then click **Check for update now** if you wish only to see if an update is available.

Critical Software Downloads — Infrequently, critical software upgrades may be necessary. These will take place automatically and a forced reboot of the **smartbox** will occur at the time specified in **Time to reboot after update** field.

CHAPTER 8 SPECIFY CONTENT INTERFACE PORT

In order to output IP content, one or more of the **smartbox** data ports 2—4 need to be configured as a content interface port. (See figure 16.)

1. Click the **Chassis** tab.
2. Locate the list of data ports on the right side of the window.
3. Click the drop-down box next to the desired data port and select **Content Interface**.
4. Click **Apply**. Set up all the data ports needed.

The screenshot shows the 'Chassis' configuration page. The 'Data Port' section is highlighted with a red box. It contains a table with four rows: Data 1, Data 2, Data 3, and Data 4. Each row has a dropdown menu next to it. Data 1 is set to 'Control Interface', Data 2 is set to 'Disabled', Data 3 is set to 'Content Interface', and Data 4 is set to 'Disabled'. Below the table are 'Apply' and 'Undo' buttons.

Data Port	Interface
Data 1	Control Interface
Data 2	Disabled
Data 3	Content Interface
Data 4	Disabled

Figure 16. Data Port — Content Interface

CHAPTER 9 SCAN SERVICES/MAP SERVICES

The contents of the Services (Source/Name) list depend on the input to the **smartbox** and the services authorized by DISH. The options found on the Services tab provide the mechanisms for receiving services from different sources (satellite, OTA/ATSC, etc.) Options are provided to map the services to output channels, to set up a Welcome Channel, and a Program Guide.

Scan for Services

1. Click the **Services** tab on the **smartbox** Home page.
2. Click **Scan for Satellite Services** under **Actions**. The system checks to see what services are available and populates the **Source** and **Name** columns with services/channels that are available for configuration. Close the information message when the scan is complete.
3. Click **Scan for ATSC Services** (if ATSC blade is installed). Close the information message when the scan is complete.

System

Services

Actions

Apply

Undo Changes

Quick Add

Add IP Input

Scan for Satellite Services

Scan for ATSC Services

Remove All Services

Information

Satellite Services (312)

Off-Air Services (20)

Services with error (0)

Status	Source	Name	QAM Channel	NTSC Channel	IP Stream	Details
✖	ATSC	Antenna (69-2)		-		▼
✖	ATSC	COZI-TV (39-2)		-		▼
✖	ATSC	COZY-TV (4-2)		-		▼
⚠	ATSC	CUSTOM (3-11)	112-2	-		▼
✔	ATSC	CUSTOM (3-13)	111-3	-		▼
✔	ATSC	CUSTOM (3-24)	111-1	-		▼
✔	ATSC	CUSTOM (4-13)	112-3	-		▼
✔	ATSC	CUSTOM (4-31)	110-1	-		▼
✔	ATSC	CUSTOM (5-13)	110-2	-		▼
✔	ATSC	CUSTOM (5-38)	110-3	-		▼
✔	ATSC	CUSTOM (8-24)	111-2	-		▼
✖	ATSC	KN5D-HD (39-1)		-		▼
✔	ATSC	KPBS-HD (15-1)	112-1	-		▼

Figure 17. Scan for Satellite Services/Scan for ATSC Services

4. Click the **down-arrow** under **Details** to view a service's configuration details.
5. Configure the channel/service as needed. Sample configurations for QAM and IP Stream are addressed in the following sections. When finished, click the **Apply** button (upper left of the page). In a few minutes the channels become available for viewing (TV must be programmed for new channels).

QAM Configuration

- Enable – Checked
- Type – QAM
- Output – Desired QAM Channel (QAM channel = 2 to 155; subchannel = 1 to 3; i.e., 10-1)
- Output Blade – Auto
- Format – MPEG-2/H.264
- Encryption – Desired Encryption (i.e., Pro:Idiom)

IP Stream Configuration

- Enable – Checked
- Type – IP
- Output – Desired IP/Port (i.e., 224.0.0.1:7000)
- Not an Option
- Format – MPEG-2/H.264
- Encryption – Desired encryption (i.e., Pro:Idiom)

Quick Add

The Quick Add option allows the operator to add a service that was not added when scanning for services. However, some service numbers may not be authorized for **smartbox**. To add a service, click the **Quick Add** button on the **Services** tab, then define the following.

- Enable – Checked
- Input Type – Select Satellite or Off-Air (ATSC)
- Service Number – Enter the service number
- Output Type – Select QAM or IP Stream
- Output – QAM channel = 2 to 155; subchannel = 1 to 3; i.e., 10-1; IP Stream = Desired IP/Port (i.e., 224.0.0.1:7000)
- Output Blade – Auto (default)
- Format – MPEG-2/H.264 (default)
- Encryption – Desired encryption (i.e., Pro:Idiom)

Then click **Add** and the new service appears in the list.

Add IP Input (Including Welcome Channel)

This option allows the user to incorporate Welcome Channels and other IP inputs in the services list.

NOTE: One or more of the **smartbox** data ports 2—4 need to be configured as a content interface port. (Refer to Chapter 8.)

Click the **Add IP Input** button and define the following variables.

- Multicast Address
- Port – UDP port number
- Name – Limited to seven characters
- Description – Limited to thirty characters
- Enable – Checked
- Output – Type QAM
- Output – Desired QAM Channel (QAM channel = 2 to 155; subchannel = 1 to 3; i.e., 10-1)
- Output Blade – Select Auto or blade number

CHAPTER 10 SET UP A PROGRAM GUIDE

The Program Guide is a scrolling guide that includes a list of services and programs available to viewers. (See figure 18.)

dishGuide

TODAY	1/30	6:00p	6:18	6:30p	7:00p	7:30p	8:00p	8:30p
113	COOK	Food(ography)		Food(ography)	Throwdown with	Symon's Suppers	The Fabulous	
112	HGTV	Buying and Selling			Extreme Homes		House Hunters	
111	DIY	King of Dirt		King of Dirt	The Vanilla Ice Proj	The Vanilla Ice Proj	The Vanilla Ice Proj	King of Dirt
110	FOOD	30-Minute Meals			Barefoot Contessa	Paula's Home Court	Trisha's Southern Cooking	
109	LMN	Ann Rule's Everything She Ever Wanted						
108	LIFE	Wife Swap			Grey's Anatomy		Wife Swap	
107	CMDY	Futurama		Futurama	It's Always Sunny in	South Park	Tosh.O	Tosh.O
106	TVLND	Bonanza		The Nanny	The Nanny	The Golden Girls	Bonanza	
105	USA	< Avatar			NCIS		NCIS	

dish

Figure 18. DISH Program Guide

Configure Program Guide Output Options

The options for managing the Program Guide are accessed on the Service tab, where the “Guide” appears as a Source like other services. The Program Guide can be assigned to one output or multiple outputs like any other service.

From the **Services** tab:

- 1. Click the **Details** down-arrow to the right of the Guide. (See figure 19.)
- 2. Select an output type (**QAM** or **IP Stream**).
- 3. Enter the **output** number.
- 4. Enter the **virtual channel** number for the Guide, if applicable.
- 5. Click **Apply**.

NOTE: When configuring outputs for the Guide, be sure to check the Virtual Channel Number box or the channel will be excluded from the Program Guide.

System

Services

Guide

Actions

Apply

Undo Changes

Quick Add

Add IP Input

Scan for Satellite Services

Scan for ATSC Services

Remove All Services

Information

Satellite Services (260)

Off-Air Services (55)

Services with error (0)

Status	Source	Name	QAM Channel	NTSC Channel	IP Stream	Virtual Channel	Details
✓	Guide	Program Guide	118-1	-		32	⬇

Status

Enable

Type

Output

Output Blade

Format

Encryption

Priority

Remove

✓

☒

QAM

118-1

Auto

MPEG-2/H.264

Clear

1

☐

Virtual Channel Number

Add another Output

✓	IP	Welcom2 (224.1.1.1:10011)	120-1	-		34	⬇
✓	IP	Welcome (224.1.1.1:10010)	119-1	-		33	⬇
✗	ATSC	Antenna (5-2)		-			⬆

Status

Enable

Type

Output

Output Blade

Format

Encryption

Priority

Remove

✗

☒

QAM

Auto

MPEG-2/H.264

Clear

☐

Virtual Channel Number

Add another Output

Figure 19. Guide Output Options

Configure Update Time for the Guide Channel

The Guide channel's information can be updated immediately after adding new information or it can be set to update on a daily basis. (See figure 20.)

- Click **Start Program Data Update** for an immediate update, or
- Select a time from the drop-down box for the Guide information to be automatically updated each day—confirm the time by clicking **Apply**.

NOTE: Lowest priority service will be removed during update if no tuners are available.

The screenshot shows a web interface with a red header bar containing 'System', 'Services', and 'Guide' tabs. Below the header is a 'Configurations' section. The 'Program Data Update' section contains a dropdown menu for 'Automatically Update At' set to '5:30am', a button labeled 'Start Program Data Update' under the 'Update Now' heading, and a status message with a green checkmark: 'Last update completed successfully.'

Figure 20. Update Program Guide Channel Information

CHAPTER 11 SOAK TEST AND PREPARE TO SHIP

Soak Test

Once the **smartbox** has been assembled, allow it to run from 24 to 48 hours. At the end of the run, perform a functional test to ensure all components are functioning as they should be.

Prepare to Ship

Once the soak test has been completed, the unit is ready to be disassembled and packed for shipping to the customer site.

1. Unplug power sources, LNBF cables, and data cables. Package cables to include in box.
2. Remove power supplies from the chassis.

CAUTION: These must be shipped outside the chassis. Leaving them in the chassis could damage the **smartbox** power supply or backplane.

3. Remove antenna from SMA connector; wrap it securely.
4. Re-pack chassis in original box.
5. Add cables, power supplies, cellular antenna, and other accessories as needed.

CHAPTER 12 INSTALL ON CUSTOMER SITE

The following table includes a high-level “punch list” of tasks, actions, and references to assist you in setting up a **smartbox** on a customer site. The instructions are very similar to an initial installation with the exception of not having to sync software versions for mixed blades. The list also assumes that software was updated during testing on the integration site and is up to date. However, software should be checked to ensure that it is the latest version.

TASK	ACTION	REFERENCE
Unpack and reassemble smartbox and connections.	Follow guidelines for installation.	Chapter 2 Assemble Hardware
Establish software connection.	Set up TCP/IP connection and login.	Chapter 3 Establish Connection with smartbox
Verify tuners lock.	Blades Tab → Verify tuners have locked for each blade.	Chapter 5 Enable Satellites and Verify That Tuners Lock
Discover spot beams.	Chassis Tab → Start Spot Beam Scan	Chapter 6 Scan for Spot Beam Satellites
Scan for satellite services.	Services Tab → Scan for Satellite Services Configure Satellite Services	Chapter 9 Scan Services/Map Services
Scan for ATSC services.	Services Tab → Scan for ATSC Services Configure ATSC Services	Chapter 9 Scan Services/Map Services

CHAPTER 13 STATUS, WARNINGS, AND FAULTS

Log history data is provided by the **smartbox**. The user interface for log history provides the following commands: Clear System Logs and Attempt to Clear Alarm. **smartbox** alarm messages are triggered by the following events :

- A feature has been enabled/disabled and a corresponding configuration change has occurred.
- A blade has been installed or removed.
- Status of blade, chassis, or power supply has changed.
- **smartbox** is unable to connect to cellular network.
- Any change in software download status.
- Blades have been disabled for power/temperature reasons.
- Change in service status.
- Change in transponder status.
- Low/High input signal level warnings (satellite input number, ATSC channel number).
- Tuner(s) not locked (slot number and tuner number).
- Services not authorized to descramble.
- Input absent on configured IP input (data port number).
- Over-temperature warning/fault.
- Fan fault (including fan number).
- Power supply fault (including power supply slot).

CHAPTER 14 RESHIPPING smartboxes

1. Unplug and remove power supplies.
2. Remove cellular antenna.
3. Remove all cables from satellite ports and data ports.
4. Re-pack in original shipping materials.
5. Contact DISH for information on how to return components for repair or replacement.

CHAPTER 15 TECHNICAL NOTES

Blades and power supplies are hot-swappable. However, after swapping any blade, a software download and system authorization may need to be executed.

CHAPTER 16 WARRANTY INFORMATION AND RETURN AUTHORIZATION

Information about product warranty and the return authorization process can be found on the retailer care site.

CHAPTER 17 SYSTEM LIMITATIONS

1. Satellite at 121 is not supported.
2. Systems using more than QAM blade should not be configured using the auto output option, but rather should be configured specifying specific QAM blades.
3. System can support up to two welcome channels (IP Input streams).
4. System must have at least one satellite receiver blade to operate.
5. Systems using more than one ATSC receiver blade must be connected to a single shared antenna.

CHAPTER 18 FEATURE ENABLING CODES

The control of incoming satellite data is handled by the following product enabling features:

DRM Pro:Idiom allows the output of video with Zenith Pro:Idiom DRM encryption. In order to use this DRM, a one-time licensing fee per chassis will be charged to the account.

DRM Verimatrix allows the output of video with Verimatrix DRM encryption. In order to use this DRM, a licensed Verimatrix key server is needed.

DRM Digital Upgrade allows the output of the Dish QAM mode of operations for use with DISH receivers at each television.

EPG Enable allows the output of a scrolling channel guide over IP, QAM, or analog. Please note there is a monthly cost that will be charged to the account for this feature.

HD Over Coax allows the output of video with HD Over Coax Watermarking. There are programming restrictions when using this output format.

Output IP enables the unit to output an IP signal using data ports 2—4 or an installed media server blade. This code needs to be used in conjunction with DRM.

Output Analog enables the unit to output an analog signal using an installed NTSC TV blade.

Output QAM enables the unit to output a QAM signal using an installed QAM blade. This code needs to be used in conjunction with Digital Rights Management (DRM).

For any questions regarding pricing or available feature options, please see your area sales manager.

CHAPTER 19 ATSC DIAGNOSTIC INFORMATION

If an ATSC channel is not coming through, check the diagnostic information for the ATSC blade.

1. Click the **Blades** tab.
2. Click the **down arrow** under **Details** for the ATSC card.
3. Verify the following:

RSSI – Received Signal Strength Indicator

Low RSSI indicates the antenna is not tuned correctly. In the event of a low RSSI, the **smartbox** may not be able to lock to a service. -75 is the lowest value for which the software will assign a service to a tuner.

Tuner Lock and Demod Lock

Both Tuner and Demod must be locked in order to receive data from a station.

Demod SNR - Demod Signal-to-Noise Ratio

This value indicates a signal-to-noise ratio for the individual tuner. Higher is better. Above 5 is good.

RS Uncorrected – Reed Solomon Errors

When the signal is weak, there may be a lot of RS errors. Each error causes a drop of at least one packet of data and usually results in deteriorated picture or sound. Zero is good; more than a few indicates problems.

CHAPTER 20 HARDWARE COMPONENT DESCRIPTIONS

16 Slot Chassis

Each chassis can hold up to 16 blades. The chassis comes equipped with 2 hot swappable power supplies, a power supply filler plate, and a cellular modem for communication back to DISH.

8-Channel Satellite Receiver Blade

Each satellite receiver blade provides eight channels of satellite TV service via eight discrete tuners. Each blade has two smart cards and two ProCams that are authorized in the same manner as a residential DISH receiver.

Transcoder Module

Each transcoder module is a daughter card that can be plugged into either the satellite receiver blades or the ATSC receiver blades. The transcoder module can be configured to convert video content from HD to HD, from HD to SD, from MPEG-2 to MPEG-4 (H.264), and from MPEG-4 (H.264) to MPEG-2.

8-Channel ATSC Receiver Blade

Each ATSC receiver blade provides up to eight programs from up to eight channels of digital, over-the-air (OTA) TV service .

16-Channel QAM Blade

Each 16-channel QAM blade outputs digital audio/video signals for distribution via standard CATV (5-1000 MHz) coax infrastructure. A maximum of 64 bulk MPEG-4 HD channels are supported. DRM encoding may be added as needed. The primary use of the 16-channel QAM blade is to deliver bulk programming in an FTG environment.

Power Supply

Each power supply is hot-swappable. Two power supplies are included with each chassis – one for power, the other as backup. An additional slot is available for additional redundancy or high-power **smartbox** installations.

Chassis Spare Fan Assembly

A spare fan assembly is provided. Use it to replace the original chassis fan in the event of failure.

Power Supply Spare Fan Assembly

The spare power supply fan is intended for replacement in case of failure.

Single Blade Filler Plate

Single blade filler plates are used to cover unused slots in the chassis. All slots need to contain either a blade or a filler plate for the **smartbox** to function.

Power Supply Filler Plate

One power supply filler plate is included with each chassis. The power supply filler plate is used to cover an unused power supply slot in the chassis.

CHAPTER 21 TECHNICAL SPECIFICATIONS

Power Consumption

The **smartbox** chassis allows for up to three power supplies to be installed. The power supplies are load sharing and provide auto-sensing backup for a failed supply. Each power supply can deliver 600W over the entire **smartbox** operating temperature range. The total power consumption for blade configurations that support typical applications is less than 600W; meaning two power supplies provide 1:1 redundancy. The estimated power consumption for each blade is provided in the table below:

	Power (Watts)
Chassis Assembly	90
Satellite Receiver Blade	30
ATSC Receiver Blade	20
Transcoder Sub-Module	30
QAM16 Blade	25
QAM48 Blade	50
QAM96 Blade	50
NTSC Modulator Blade	70

Example power consumption for FTG configuration with 16 QAM outputs and 40 services:

1 Chassis Assembly	1 x 90W = 90W
5 Satellite Receiver Blades (8 services each)	5 x 30W = 150W
1 QAM16 Blade	1 x 25W = 25W
Total smartbox DC power consumption	265W

The 600W maximum power delivery for each power supply is specified for the DC power the supply can deliver to the **smartbox**. The power numbers in the table above are for DC power consumption.

NOTE: The actual power consumption of the **smartbox** will be roughly 10% greater due to normal power supply inefficiency and the operating temperature of the **smartbox**.

Chassis Assembly Specifications

Mechanical and Environmental

Dimensions (H x W x D)	8.7" x 17.6" x 15.8" (compatible with 19" EIA rack)
Weight	17.0 lbs, incl. 2 PS, 1 PS cover, no Filler Plates, no Blades
Line Voltage	90 to 264 VAC, 47 to 64 Hz
Power Consumption	MAX 1200W
Operating Temperature	0 – 50°C (32 – 122°F), non-condensing.

Blade Options

Satellite Receiver Blade	1 to 12 Blades
ATSC Receiver Blade	0 to 3 Blades
QAM 16 Blade	0 to 2 Blades
NTSC Analog Blade	0 to 3 Blades

Satellite Inputs (from LNB)

Number of Inputs	4, labeled Sat 1 thru Sat 4
Connector	F, female
Impedance	75 ohms
Input Frequency	L-Band, 950 – 2150 MHz
Input Power	-25 to -65 dBm, aggregate
Return Loss	> 15dB

Satellite Input LED Indicators

Number of LEDs	4, associated with each of 4 Satellite inputs
Green	Signal power is detected on LNB
Amber	High signal on LNB
Red	Low or no signal detected
Off	Not used

Network Interfaces

Number of Inputs	4, labeled Data 1 through Data 4
Connections	RJ-45, GbE, Full Duplex, Auto-Negotiate
Addressing	Unicast, Multicast, (IGMP v 1/2/3)
Transport Protocol	UDP/IP
Transport Format	SPTS
IP Management	HTTP, TR-069
Local User Interface	Web Browser

Cellular Modem Antenna Interface

Number of Connectors	1, labeled Cellular Antenna
Connector	SMA, female
Impedance	50 ohms
Input Sensitivity	-105 dBm typical
Transmit Power	+24.5dBm typical

Cellular Modem LED Indicator

Number of Indicators	1, labeled Cellular Antenna
Green	Signal power is detected on antenna
Amber	Low signal at antenna input
Red	No signal detected
Off	Not used


Earth Ground Connection

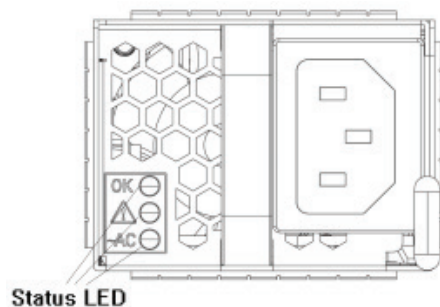
Number of Grounds	1, labeled with Ground Symbol
-------------------	-------------------------------

Power Supply Module

Input Voltage	90-264 Vac
Input Frequency	47 – 64 Hz
Maximum Input Current	9 Amps
Special Features	N + 1 Redundant Hot swap High efficiency 91%@230 Vac, 50% load Variable speed “smart fans” 600W delivered over 0 – 50°C

LED Indicator for Power Supply

LED	Function	Color
OK	DC OK	Green
	Fail	Yellow
~AC	AC OK	Green



LED Status

Conditions: Assumes two or more power supplies present and ON	DC	Fail	AC
No problems and power supply is on.	On	Off	On
Vo 12V Over current.	On	Off	On
AC input fail.	Off	Off	Off
Fan blocked or running under speed but outputs still within spec and not over temperature. This is a Warning condition.	On	On	Off
Over temperature and power supply has turned off.	On	Off	On
Fan below shutdown limit.	On	Off	On

Satellite Receiver Blade

Dimensions (H x W x D)	7.5 x 0.9 x 14.5		
Power Consumption	30W (Typical)		
Satellite Channels	8 transponders and/or 8 programs		
Modulation Rates	DVB-S:	Symbol Rates	1 to 45 MSps
		Interleave	1/2, 2/3, 3/4, 5/6, 7/8
	DVB-S2:	Symbol Rates	5 to 33 MSps
		QPSK Interleave	1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
		8PSK Interleave	3/5, 2/3, 3/4, 5/6, 8/9, 9/10
	Turbo FEC:	Symbol Rates	2 to 30 MSps
		QPSK Interleave	1/2, 2/3, 3/4, 5/6, 7/8
		8PSK Interleave	2/3, 3/4, 4/5, 5/6, 8/9
Acquisition Range			± 5 MHz
Optional Modules			Transcoder

ATSC Receiver Blade

Dimensions (H x W x D)	7.5 x 0.9 x 13.5		
Power Consumption	20W (Typical)		
Connector	F-Female		
ATSC Channels	8 carriers and/or 8 programs		
Frequency Range	42 to 1002 MHz		
Input Level per Carrier	-35 to +44 dBmV		
Return Loss	>15 dB		
Impedance	75 ohms		
Optional Modules	Transcoder		

Transcoder Module

Dimensions (H x W x D)	6.0 x 0.8 x 4.5
Power Consumption	30W (Typical)
Conversions Supported	MPEG-4 to MPEG-4 (H.264) either HD or SD with lower output bit rate (transrating) with no format conversion
	MPEG-4 (H.264) to MPEG-2 either HD or SD with no format conversion
	MPEG-2 to MPEG-4 (H.264) either HD or SD with no format conversion
	MPEG-2 or MPEG-4 HD (H.264) to MPEG-2 SD with format conversion to 480i with no cropping

QAM 16 Blade

Dimensions (H x W x D)	7.5 x 0.9 x 13.5
Power Consumption	25W (typical)
Connector	F-Female
Output Frequency	45 to 1003 MHz
Channel Bandwidth	16 channels, 2.24 to 8.05 MHz
Modulation	ITU-T J.83 Annex A, C (16QAM, 32QAM, 64QAM, 128QAM or 256QAM) ITU-T J.83B Annex B (64,256QAM)
QAM Symbol Rate	2.0-7.0 Msps
Interleaving	128/1 Annex B. 12/17 Annex A, C
Channel Plans	EIA, HRC, IRC, Manual
Output Frequency Accuracy	125 Hz
Output Level	45 dBmV effective pre-combined output power
Output Attenuation	0 to 10 dB (0.5 dB step)
Output Level Flatness	(45 to 864 MHz) ± 1 dB (45 to 1003 MHz) ± 2 dB
Spurious	> 60 dBc (in 4MHz)
Output Impedance	75 ohms
Output Return Loss	>11 dB

REGULATORY COMPLIANCE

North America

Emissions – FCC

This device complies with Part 15 of the FCC rules. Operation of this device is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Safety – UL and CSA

UL 60950-1:R:2011-12

CAN/CSA-C22.2 No. 60950-1:A1:2011

Europe

The **smartbox** was tested according to the requirements of the EMC Directive 89/336/EEC and Low Voltage directive 73/23/eec and complies with all the requirements for the CE mark. The **smartbox** is production monitored by Tuv SÜD America and may bear the TUV CUE mark.

EMC

EN55022 (2010) Class B

EN55024 (2010) Class B

EN61000-4-2 (2009)

EN61000-4-3 (2006)

EN61000-4-4 (2004)

EN61000-4-5 (2006)

EN61000-4-6 (2009)

EN61000-4-11 (2004)

Safety – TUV

EN 60950-1:2006+A11: A12:2011



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